MAINE PUBLIC UTILITIES COMMISSION

Report on Time-of-Use Rates and Advance Metering Infrastructure

March 16, 2009

I. INTRODUCTION

During the 2008 session, the Legislature enacted Resolve, To Encourage Renewable Energy and Energy Conservation in Maine ("Resolve").[1] Section 4 of the Resolve directs the Commission to conduct a review of time-of-use ("TOU") rates and advance metering infrastructure ("AMI") and submit a report to the Utilities and Energy Committee ("Committee") by March 15, 2009. Specifically, the Resolve states in relevant part:

> That the Public Utilities Commission shall develop a proposal for establishing time-of-use rates for commercial and residential electricity customers. The proposal must provide for differential rates for the cost of energy based on the time of use of the energy, adjusted by the level of demand on the energy grid. The commission shall also develop a proposal for an advanced metering infrastructure program that would enable all commercial and residential customers to have installed electric meters that can provide customers with energy price information. Any proposal developed under this section must be found by the commission to be cost-effective, taking into account the full range of potential costs and benefits, with or without the inclusion of an opt-out provision.

The Resolve specifically states that the requirements of this section are not intended to interfere with any pending proceedings before the Commission relating to the subject matter of the section.

At the time the Resolve was being developed, the Commission informed the Committee that it was in the process of conducting advanced metering and rate design proceedings for Central Maine Power Company ("CMP") and Bangor Hydro-Electric Company ("BHE"). The Commission understood its direction to be to continue with those proceedings and provide the Committee with a report on the status of TOU rates and AMI, and the costs and benefits of moving towards more sophisticated metering infrastructure.

[1] Resolves 2007, ch. 183.

II. OVERVIEW

A. Time-of-Use Rates

TOU rates generally refer to utility rates that vary by time-of-day.[2] Rates that vary by time-of-day require the use of TOU meters to collect the usage by time period for billing purposes. TOU rates have been available or mandatory in Maine since the 1980s. Generally, they have been mandatory for larger commercial customers and optional for small commercial and residential customers. With the restructuring of the electric industry in 2000, the utility transmission and distribution ("T&D") portion of the rate was separated from the competitive generation portion of the rate. After restructuring, Maine's utilities continue to offer TOU rates for their portion of the bill. However, the generation portion of the bill, now served by competitive electricity providers ("CEP"), may or may not be offered on a TOU basis, depending on the CEP's agreement with the customer.

The Commission understands that many larger customers are served by CEPs on a TOU basis. Thus, even though standard offer prices for larger customers are not always time-differentiated, TOU options are available in the market. In contrast, virtually all residential and smaller commercial customers take standard offer service and receive bills in which neither portion (T&D or generation) is time-differentiated. Non-standard offer options for these customers have not been available in the market and are not likely to be available in the foreseeable future. Furthermore, the deployment of AMI meters and associated systems is necessary to offer residential and smaller commercial customers rates that are time-differentiated.

B. Advanced Metering Technology

Advanced metering technology includes meters and related systems with varying levels of capability, including: detailed customer usage measurement; customer usage data storage; automated and remote meter reading; and communications to and from the meter. At one end of the spectrum are automated meter reading (AMR) meters that can be read remotely.[3] AMR systems can provide operational savings (such as reduced meter reading costs). At the other end of the spectrum are full-scale AMI systems that can collect,

[2] TOU rates may also vary by month or by season.

[3] The degree of remoteness varies among systems, however, as this term can apply to meters that can be read by walking or driving by as well as those that can be read over a network.

analyze, report, and store hourly (or more often) meter reads, and provide a platform for customer demand-response features and TOU pricing.

All AMI systems, and some AMR systems, use two-way communication networks to pass information to and from the meter. There are a variety of network technologies that can be used for AMI/AMR communications, including radio frequency systems, systems that use existing telephone lines, broadband systems, wireless cell phone and satellite systems, and systems, such as BHE uses, that use a two-way automated communication system power line carrier system.

The software and hardware of an AMI system that collects, manages and stores the significant quantity of data from frequent meter reads is generally referred to as the Meter Data Management System ("MDMS").[4] AMR systems do not have an MDMS system and it is the presence, or absence, of this capability that essentially distinguishes AMI from AMR systems.

In addition, AMI requires integration from the MDMS system to the utility's billing and other back office systems. This integration must be done in a way that provides a sufficiently capable and flexible platform to allow data from AMI to be developed into products and services that provide value for consumers in terms of reduced electricity bills. These applications are specific to each utility's billing system and require the implementation of customized hardware and software.

AMI deployment would allow a variety of programs to be developed that could lower the costs of energy and capacity. These include: optional TOU standard offer rates for residential and smaller commercial customers (whereby customers see the same cost differentials incurred by suppliers in the market); critical peak pricing whereby customers can lower their bills by reducing usage during the peak hours of the year; and programs (perhaps developed and supported by Efficiency Maine) that allow suppliers (or the utility on their behalf) to directly control customer loads. Programs may also include systems that would allow customers to view their account information and any relevant system information through the internet, as well as systems that provide market or meter information via the AMI equipment back to the customer or the customer's appliances. This could occur by sending a signal from the meter to in-home display units, or by sending a signal directly to particular appliances equipped with receiving units.

[4] It appears that MDMS systems generally work with a variety of advanced meters and are not brand-specific.

AMI deployment would also provide T&D operational savings. These savings would result primarily from reduced meter reading costs and the ability of the utility to remotely evaluate, track and manage system problems, such as outages.

Full AMI implementation, however, is costly. To determine whether AMI implementation is cost-effective, the cost of installing the system must be compared to two categories of benefits: 1) operational savings; and 2) capacity and energy savings that result from providing customers with real-time cost and price information.

III. COMMISSION REVIEW OF ADVANCED METERING

A. Economic Analysis

As mentioned above, the Commission has been engaged in a comprehensive examination of the costs and benefits of advanced metering for both CMP and BHE. When AMI or AMR is implemented, a utility incurs costs associated with purchasing new meters, associated hardware, computer applications, and adjustments to the billing system. However, offsetting operational savings are expected in areas such as meter-reading costs, storm restoration expenses, and service calls. In addition, AMI can be expected to produce some level of supply side savings through demand-response programs and TOU pricing. In order for AMI to be cost-effective, it must be reasonably likely that the operational and supply-side savings are equal to, or greater than, the implementation costs.

B. Central Maine Power Company

In its most recent rate case proceeding,[5] CMP proposed to implement AMI on a company-wide basis. CMP's proposal included providing advanced solid state meters or meter modules for all 550,000 of its customer accounts, supported by a two-way communications network and a meter data management system. CMP also examined and provided cost estimates for necessary changes to its back-office and billing processes and systems to allow the AMI system to support supply market programs (e.g. demand response), as well as time-differentiated T&D pricing. The cost of implementing CMP's proposal was estimated to be in the range of $100 million.

Due to its cost, the CMP proposal was controversial. The Public Advocate opposed the proposal on the grounds that the benefits did not appear to outweigh the substantial cost.

[5] Docket No. 2007-215.

At the conclusion of the rate case proceeding, the parties agreed to defer a decision on the AMI proposal and continue the examination of the cost benefit issues. Subsequently, CMP reversed its position and no longer advocates proceeding with AMI at the current time. CMP cites immaturity and rapid change in certain aspects of AMI technology as the primary reasons to delay deployment.

In the context of the CMP proceeding, the Commission staff submitted an economic analysis that concluded that the operational savings and supply-side savings are reasonably likely to outweigh the cost of AMI deployment.[6] In particular, Commission staff concluded that the operational savings alone would almost offset the cost of implementation, so that only a relatively small amount of energy and capacity savings would be required to make the system economic. However, Commission staff noted that some of the technologies related to supply-side and individual savings appear to be in a period of rapid change.[7] Because AMI is a relatively long-lived asset, and decisions made at the outset will, for many years, affect the function of CMP's AMI system, Commission staff recommended that CMP move forward with AMI but with caution, reporting back to the Commission on the status of certain aspects of the AMI industry.

C. Bangor Hydro-Electric Company

In contrast to CMP, BHE completed an installation of AMR technology for nearly all of its residential and small commercial customers in 2005.[8] With its AMR, BHE's meter data is automatically collected and transmitted to a central computer system, where it is processed and stored. The meter data is then accessible to BHE for billing and various other customer service and operational applications. However, BHE does not currently have the ability to process and store TOU meter data, as would be done by an AMI system. In its rate proceeding,[9] BHE suggested that moving to a full scale, company-wide AMI system would be a natural expansion of its existing AMR system. Under BHE's proposal, advanced meters would be installed for

[6] *Advisory Staff Bench Analysis,* Docket Nos. 2007-215(II), 2006-661(II).

[7] These technologies are primarily those related to communications between the meter and the customer (or the customer's appliances) and those related to system security.

[8] BHE found AMR to be cost justified by reductions in distribution-related expenses.

[9] Docket No. 2006-661.

customers that do not already have them and BHE's existing communications network, meter data management system, and back-office and billing systems would be expanded to full-scale AMI.

In its economic analysis of AMI for BHE, Commission staff concluded that BHE should proceed with full AMI implementation by soliciting bids for equipment and necessary systems.[10] Commission staff noted that BHE has already incurred the most significant portion of its AMI system costs by installing advance meters for nearly all of its customers as part of its AMR program and, therefore, the additional investment needed to expand the system's capability from an AMR system to an AMI system is relatively small and should provide significant benefits. Moreover, because BHE has already installed the meters for its AMI system, it has already passed the critical decision points that cause concern for CMP's program. BHE is currently in the process of soliciting bids for full AMI implementation.

D. Maine Public Service

The Commission does not have a formal AMI proceeding pending for Maine Public Service Company ("MPS"). However, MPS, like BHE, has installed AMR meters for most of its customers based on operational savings. MPS plans to install AMR meters for its remaining customers by the end of 2010.

E. Federal Stimulus Package

During February 2009, the President signed into law the American Recovery and Reinvestment Act of 2009 ("Stimulus Act"). The Stimulus Act includes provisions that provide support for "smart grid" investments, including investments associated with T&D utility AMI. In particular, the Stimulus Act provides $4.5 billion for smart grid and other grid modernization investments. Under the Act, stimulus funds are available to: 1) support "demonstration projects" focused on advanced technologies for use in power grid sensing, communication, analysis, and power flow control; and 2) match up to 50% of the cost of "qualifying smart grid investments." The rules and procedures for obtaining grants and matching funds have not yet been established by the Department of Energy ("DOE"). However, on March 2, 2009, DOE issued a Notice of Intent to Issue Funding Opportunity Announcement entitled "Smart Grid Demonstrations." The Notice advises potential applicants to begin the on-line registration process, which could take weeks to complete. The actual Funding Opportunity Announcement ("FOA") is expected later in March 2009, and applications will likely be due within a few weeks of the FOA issuance. The criteria for awarding the matching funds will be detailed in the upcoming FOA.

[10] *Advisory Staff Bench Analysis,* Docket Nos. 2007-215(II), 2006-661(II).

The Commission has had several meetings with Maine utilities to assess the potential for accessing stimulus funds for AMI investment. CMP, BHE, and MPS have indicated that they will pursue AMI-related stimulus funds. In addition, the three utilities are collaborating with Dr. Mohamad Musavi and the University of Maine on other potential smart grid applications that may be packaged for matching grant funds

Central Maine Power

As discussed above, the issue of a substantial investment by CMP in AMI was a controversial issue in recent Commission proceedings. CMP has been reluctant to pursue an AMI project at this time due, in part, to a lack of clarity on the desired functionality and a lack of maturity in technology and standards. The Commission has encouraged CMP to proceed with an AMI bid process because the potential for federal matching funds under the stimulus program would substantially improve the economics of AMI deployment. In addition, a well-defined project that is ready to proceed would be more likely to obtain federal funding. CMP has agreed to pursue stimulus funding and is currently working with Commission staff and other parties to define the desired functionalities to be included in a request for bids from AMI vendors.

Bangor Hydro-Electric

BHE has been working actively with vendors, outside counsel and other stakeholders (such as the University of Maine researchers) to develop an understanding of the various provisions of the Stimulus Act related to AMI and other energy matters and it is interested in aggressively pursuing funding opportunities. BHE has begun the registration process and is putting together a proposal for matching grants that capitalizes on its existing AMR infrastructure to create a full-scale AMI application.

Maine Public Service

MPS plans to inventory its potentially qualifying projects so that at such time as the DOE issues the FOA, it will be in a position to take advantage of any funding opportunities that might be presented. In the meantime, MPS will be looking into the preliminary steps necessary to be a qualified grantee.

IV. CONCLUSION

The Commission views advanced metering infrastructure as important technology that will ultimately reduce T&D operational costs and provide customers with the opportunity to lower their electricity bills by reducing or shifting usage during high cost periods in response to market price signals. In particular, AMI and associated systems are necessary to provide standard offer customers with the option of obtaining rates that are time-differentiated to more closely reflect the actual changes in power costs throughout a day. Such rates would have the potential of lowering both individual customer bills and total system costs as electricity usage is switched from higher cost to lower cost periods.

As noted in a recent ISO-NE report on Smart Grid technology, "[i]investments made in today's advanced metering initiatives are important first steps on the path to the Smart Grid, and many of the capabilities envisioned for the Smart Grid will not be possible without an advanced metering infrastructure."[11] Thus, the Commission will assure that Maine's utilities pursue deployment of the technology in a way that is prudent in light of cost and developing technologies. However, the opportunity to substantially lower the cost of AMI deployment through federal stimulus dollars makes it imperative that each utility act now to develop AMI plans that will maximize it potential to qualify for federal funding.

[11] "Overview of the Smart Grid – Policies, Initiatives, and Needs" ISO New England, Inc., dated February 17, 2009